

Physiology

Practical (1)

Blood Testes Barrier & Functions of Sertoli cells

By

Staff members of
Medical Physiology

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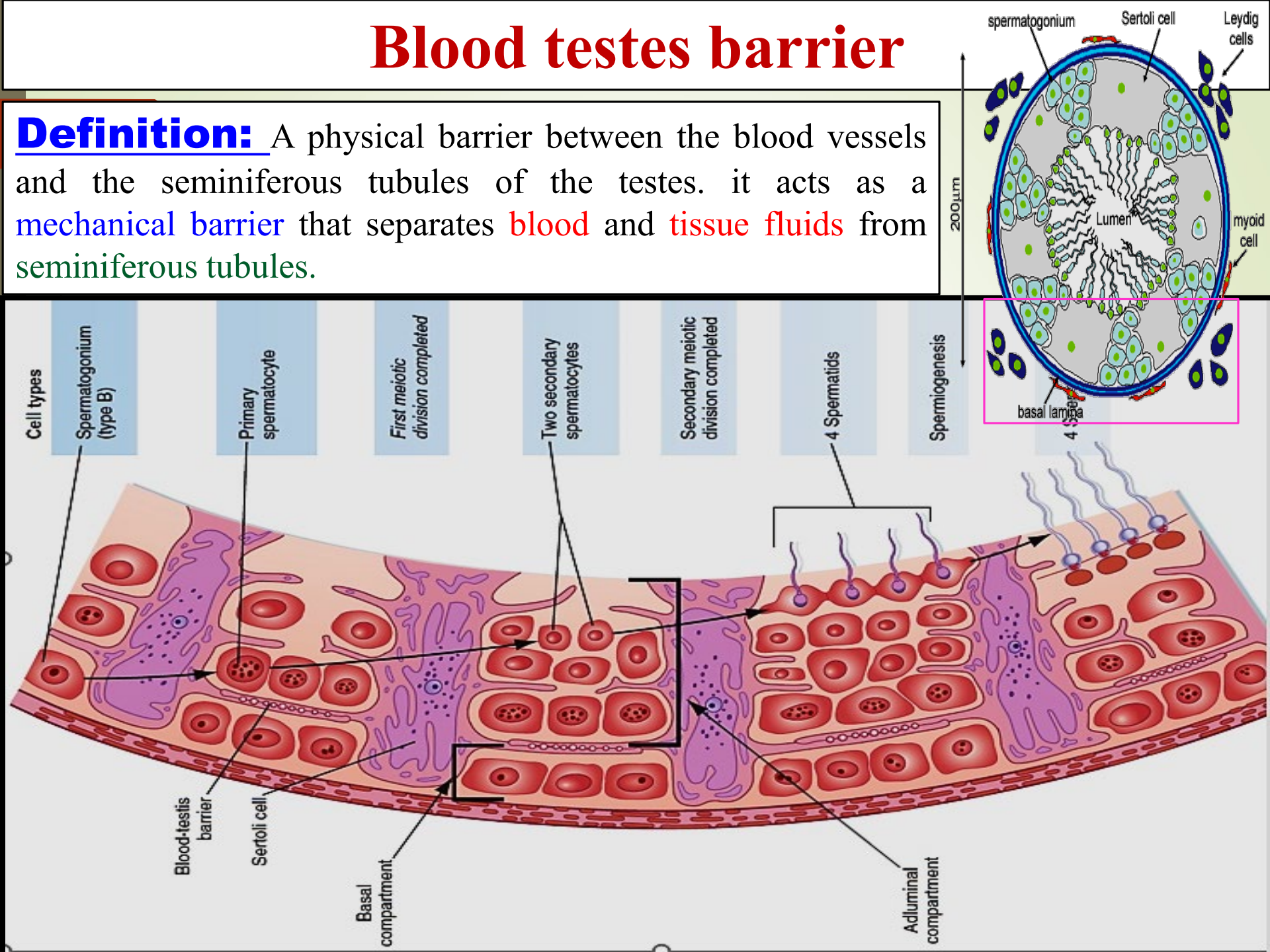
Objectives

After studying this section, you should be able to:

- **Define** blood-testis barrier.
- **Recognize** the structure of The blood-testis barrier.
- **Describe** Functions of The blood-testis barrier.
- **Describe** Functions of Sertoli cells .
- **List** hazards of destruction of blood-testis barrier.

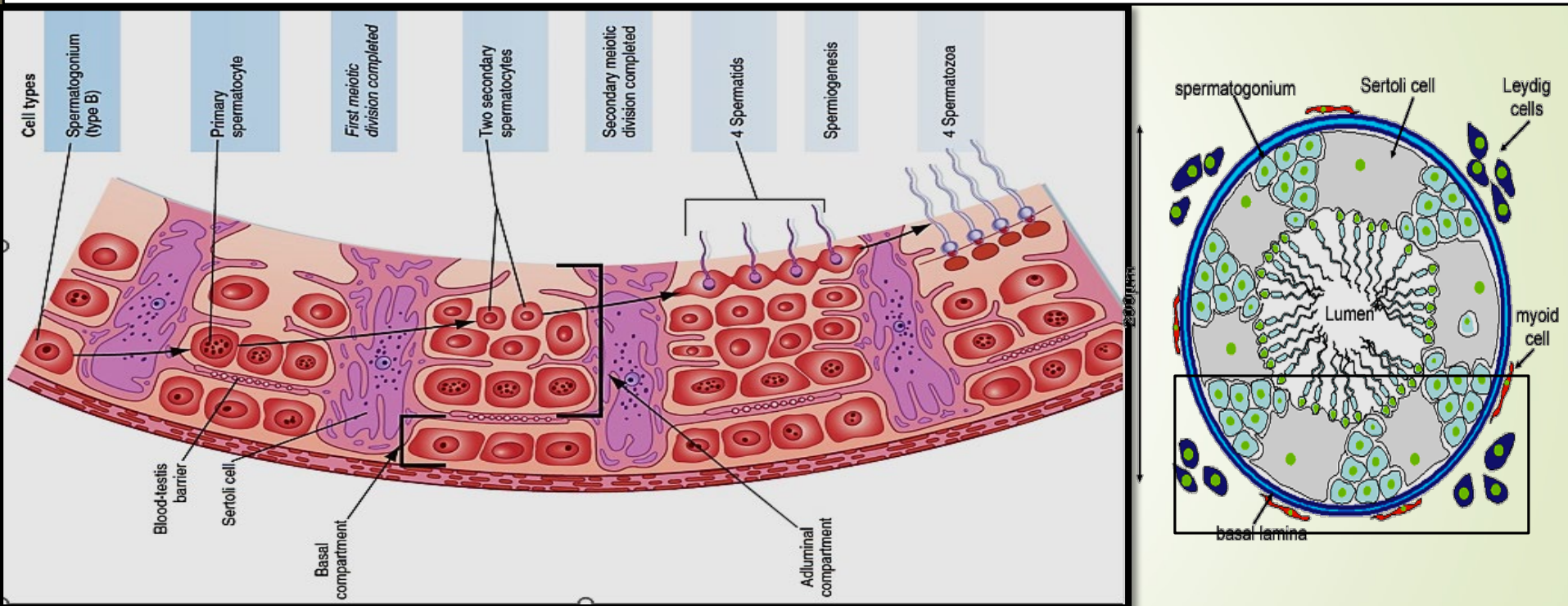
Blood testes barrier

Definition: A physical barrier between the blood vessels and the seminiferous tubules of the testes. it acts as a **mechanical barrier** that separates **blood** and **tissue fluids** from seminiferous tubules.



Structure:

- ❖ It is formed by tight junctions between the adjacent **Sertoli cells** near the basal membrane of seminiferous tubule. Thus, the Sertoli cells form an unbroken ring around the outer circumference of the seminiferous tubule.
- ❖ These tight junctions divide the seminiferous tubule into two compartments:



- 1- **A basal compartment:** between the basement membrane and the tight junctions, containing the spermatogonia and early-stage primary spermatocytes.
- 2- **An ad luminal compartment:** beginning at the tight junctions and including the lumen, containing later-stage primary spermatocytes and all subsequent stages of spermatogenic cells.

Functions of blood-testes barrier:

1. Protection of seminiferous tubules:

Blood-testes barrier protects the seminiferous tubules and spermatogenic cells by preventing the entry of toxic substances from blood and tissue fluid into the lumen of seminiferous tubules. However, blood-testes barrier permits substances essential for spermatogenesis.

❖ Substances prevented by blood-testes barrier:

- a. Large molecules including proteins, polysaccharides and cytotoxic substances.
- b. Medium-sized molecules like galactose.

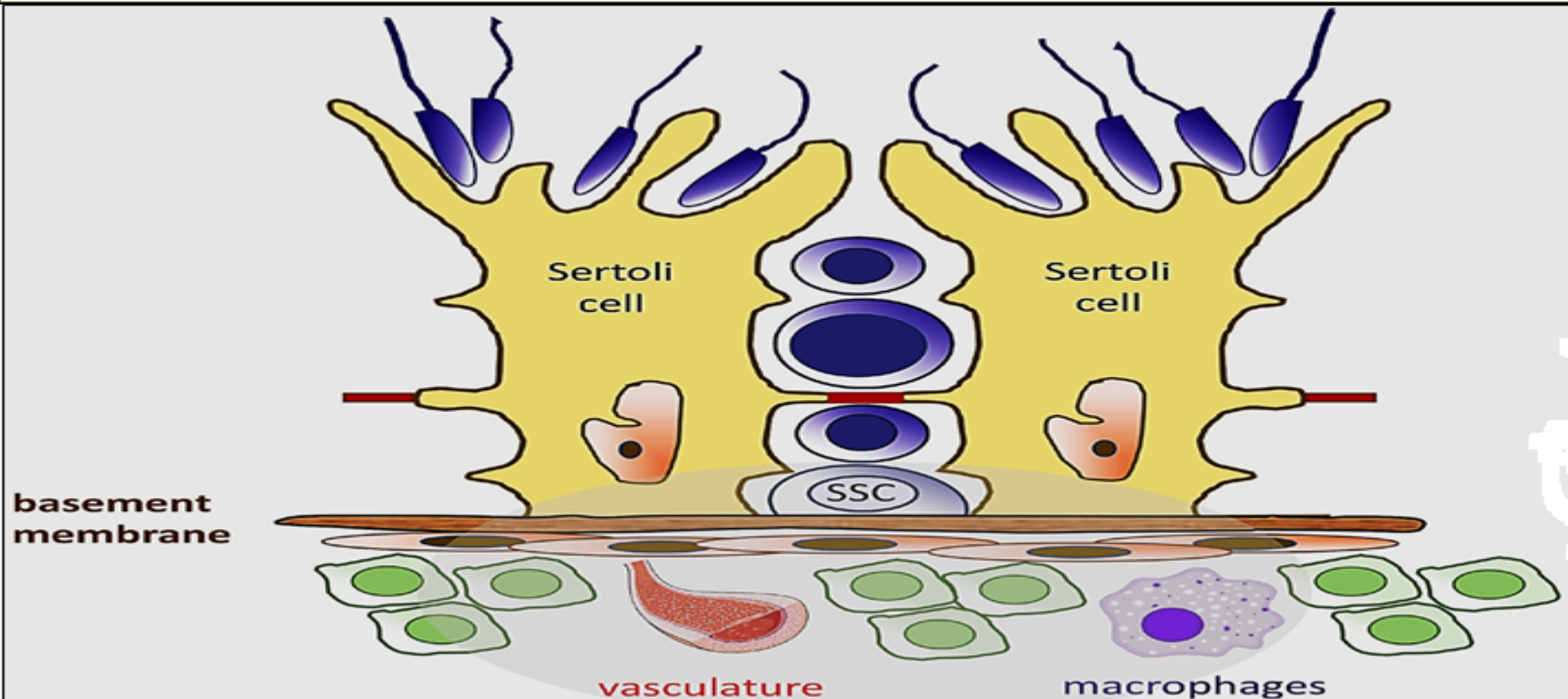
❖ Substances permitted by blood-testes barrier:

- a. Nutritive substances essential for spermatogenic cells.
- b. Hormones necessary for spermatogenesis.
- c. Water & electrolytes.

2. Prevention of autoimmune disorders:

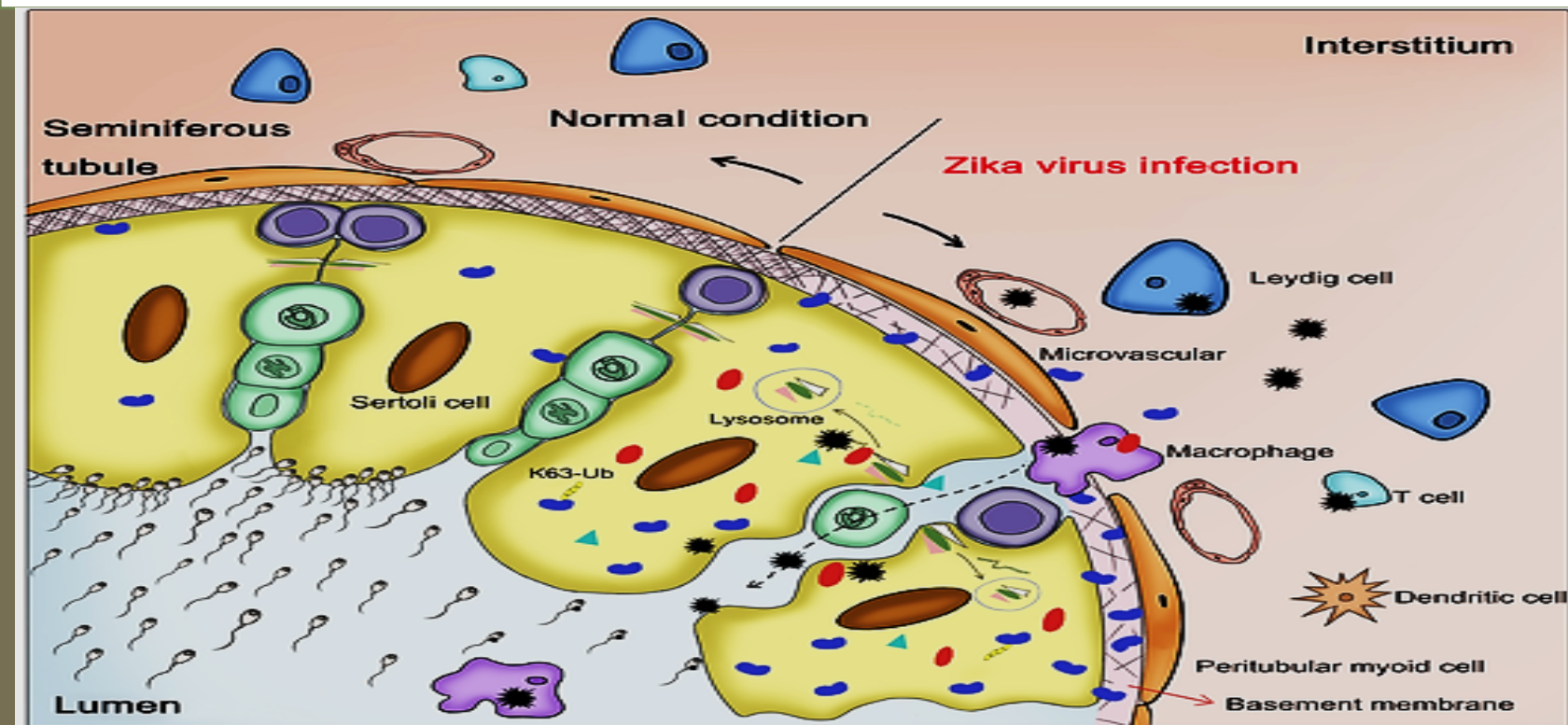
Blood-testes barrier also prevents the development of autoimmune disorders by inhibiting the movement of antigenic products of spermatogenesis from testes into blood.

3. Helps establishing an osmotic gradient: This facilitates secretion of fluid from Sertoli cells into the lumen of the seminiferous tubules, which push the non-motile sperms into the epididymis.



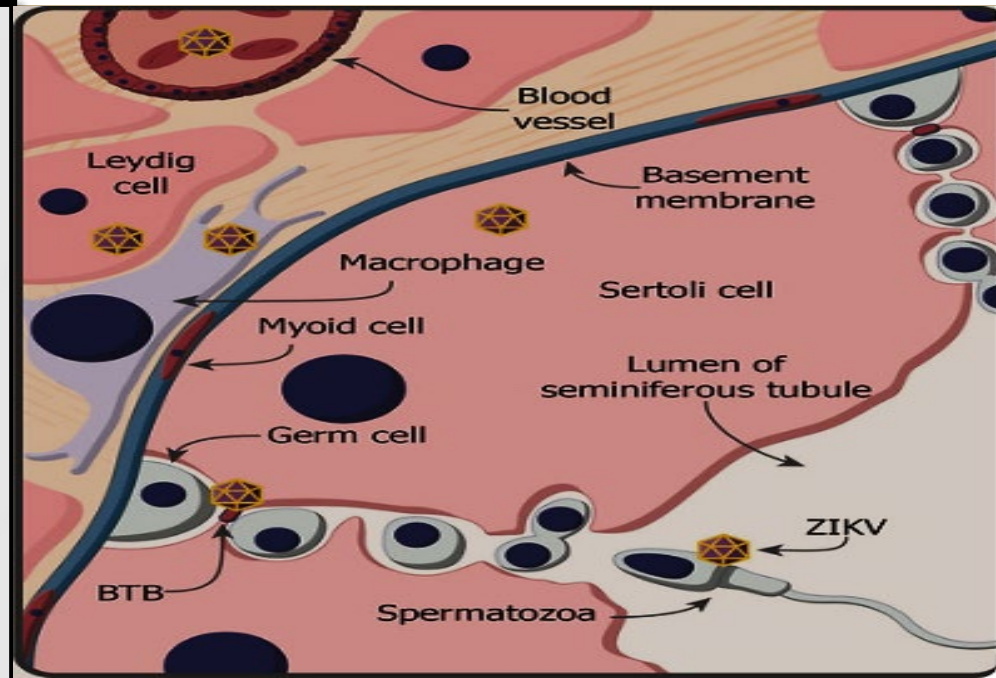
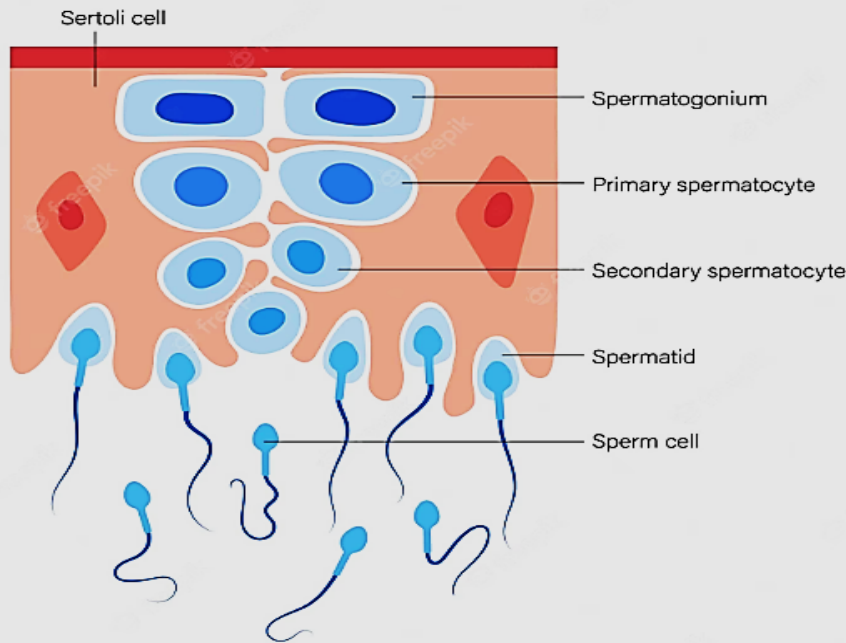
Damage of blood-testes barrier:

Blood-testes barrier is commonly damaged by **trauma** or **some viral infections like mumps**. Whenever, the blood-testes barrier is damaged the products of spermatogenesis enter the blood. The immune system of the body is activated, resulting in the production of autoantibodies against sperms. The antibodies destroy the germ cells, leading to consequent **sterility**.



Sertoli cells

- ❖ Sertoli cells are the somatic cells of the testis that are essential for testis formation and spermatogenesis.
- ❖ Sertoli cells facilitate the progression of germ cells to spermatozoa via direct contact and by controlling the environment milieu within the seminiferous tubules.
- ❖ The regulation of spermatogenesis by FSH and testosterone occurs by the action of these hormones on the Sertoli cells. While the action of testosterone is necessary for spermatogenesis, the action of FSH minimally serves to promote spermatogenic output by increasing the number of Sertoli cells.



Sertoli cells have the following functions.

1. **Supporting function.**
2. **Maintenance of blood-testes barrier which** prevents many substances from entering or leaving the seminiferous tubules .
3. **Removal** of any damaged germ cells .
4. **keep the** sperm in the tubules from diffusing into the blood.
5. **production** of seminiferous tubular fluid
6. **Nutrition of the recently formed sperms as they contain glycogen and lipids**
7. **Secretion of**
 - ❖ **Inhibin hormone** which Inhibit the release of F.S.H
 - ❖ **Estradiol and esterone.**
 - ❖ **Androgen binding protein** (ABP) which carries testosterone and estradiol.
 - ❖ **Mullerian duct inhibiting factor** (MIF). Which prevent the development of female internal sex organs in the male fetus.
8. **Spermiation** i.e. release of sperms from Sertoli cells to become free in the lumen of the seminiferous tubules. This function is under the control of L.H

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(Student book)
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 - John E. Hall, PhD and Michael E. Hall, MD, MS.
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(Text book)

The image features a stylized graphic of a rolled-up scroll. The scroll is dark gray with a lighter gray top edge and a red outline. It is partially unrolled, revealing the text 'THANK YOU' in large, orange, 3D block letters with a white outline. The scroll is set against a light gray background. On the left side, there are two diagonal stripes, one red and one dark gray, with a white line in between. The scroll has a small red circular detail at the top left corner and a small red circular detail at the bottom left corner.

THANK YOU